Instituto Federal de Santa Catarina
Campus São José
Alunas: Marina Souza e Schaiana Sonaglio
Disciplina: Sistemas Operacionais

Programação Concorrente

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Descrição do Projeto:

O objetivo do projeto é solucionar problemas na sincronização em um programa que produz e consome arquivos. Há quatro etapas que podem apresentar problemas de sincronização: na primeira etapa, há apenas um produtor, que gera um arquivo, um consumidor, que consome este arquivo, e um buffer que que armazena o arquivo; na segunda etapa, mantemos o cenário com um produtor e um consumidor e aumentamos o número de buffers; na terceira etapa, há mais de um produtor produzindo arquivos, apenas um consumidor e valores de buffer; na quarta etapa, temos vários valores de produtor, de consumidor e de buffer.

Para sincronizar o programa, colocamos um mutex (mutp_pos) no produtor para, quando o cenário tiver mais de um produtor, ele criar os arquivos sem conflito na numeração dos nomes; colocamos também um mutex (mutncons) no consumidor, para que ele consuma os arquivos com a numeração correta; foi colocado também um mutex (mutnc_pos) para garantir que é consumido na ordem correta; finalmente, usamos um mutex para sincronizar a impressão das saídas de texto.

Os semáforos garantem que o acesso ao buffer não ocorra no mesmo instante pelo produtor e o consumidor.

Problemas de sincronização encontrados:

Etapa 1: **1 buffer, 1 produtor, 1 consumidor.**

Foram adicionados mutex nos cout do programa para garantir que as mensagens fossem mostradas na ordem correta. Antes de utilizarmos semáforos para resolver o problema de sincronização, o programa consumia muito mais do que produzia. Após adicionados os semáforos, o programa, às vezes não consumia, às vezes não respondia. Para resolver isso, quando o arquivo foi criado pelo produtor, utilizamos o método "sync()" para garantir que o disco estivesse sincronizado, quando o consumidor fosse acessar. Após todos os ajustes citados acima, o programa funcionou corretamente para uma repetição (REP = 1). Para dez repetições (REP = 10), ele travou ocasionalmente. A resolução da questão do travamento foi criar a variável global "ncons", que mantém a contagem do número de vezes que foi consumido. O consumidor pára de consumir quando a comparação "PRODS*REP == ncons" for verdadeira. Antes, o consumidor parava logo depois que o produtor parava, mas, como haviam várias repetições, o produtor às vezes terminava e o consumidor ainda não tinha consumido tudo. Depois desse ajuste, está funcionando para REP = 10.

Etapa 2: **N buffers, 1 produtor, 1 consumidor.**

Nessa etapa, não houve erros, pois a solução para N buffer foi feita na etapa 1: a criação da variável "ncons" e o consumidor parar de consumir quando a comparação "PRODS*REP == ncons" for verdadeira. Para garantir o correto posicionamento na leitura e escrita do buffer, foi adicionado mutex nas variáveis cons_pos e prod_pos.

Testes realizados: 5 buffers, 1 produtor e 1 consumidor, 10 buffers, 1 produtor e 1 consumidor e para 15 buffers, 1 produtor e 1 consumidor. Todos funcionaram corretamente.

Etapa 3: **N buffers, M produtores, 1 consumidor.**
Devido às modificações anteriores, não houve erros nessa etapa.

Etapa 4: **N buffers, M produtores, Z consumidores.**
Devido às modificações anteriores, não houve erros nessa etapa.

Testes Realizados:

Legenda: (B, P, C) = (Buffer, Produtor, Consumidor).

Etapa 1:

Programa antes de qualquer sincronização:

Programa depois de colocar semáforos:

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: dde86f12-61f7-45b1-8e38-a5aea2cd10fd
Total produced: 1
Total consumed: 1
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
Massive Producer x Consumer Problem
Consumer was born!
Producer was born!
Consumed: f3ae43d1-57b4-457f-b982-3a21d049e1bc
Total produced: 1
Total consumed: 1
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: 5e893a79-3d08-41c2-af46-08ce2ee26370
```

Programa depois de colocar semáforos e sync():

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: b5db75d0-2bba-4d8c-a10e-e5952d69fbf2
Total produced: 1
Total consumed: 1
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ls /tmp/test/
schaiana@Schaiana-K46CB:~/Downloads/SOP$ 
```

Programa depois com 10 repetições (REP = 10):

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
+ ls /tmp/test
+ /home/schaiana/Downloads/SOP/multi_prod_cons
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: e72ea825-f6f8-4478-8f5f-51b9671b9e0b
Consumed: c60eb6a9-1b27-49a8-8c2d-330bc07c4d7e
Consumed: 680cfd0a-fac4-49a3-aa18-f644067cd3dd
Consumed: 2c39b976-78f9-4d89-8d4d-e6e77dcec84d
Consumed: 321bac36-74bd-4ed1-a127-152cd4c98c7c
Consumed: b975da4c-ec85-4d7c-8d8a-1a159009c0f9
Consumed: 77985b73-8435-4c48-b9d1-3d6c2c213958
Consumed: ca295746-0157-4946-be27-9e2dcfb292f4
Consumed: b1283e47-e328-4396-a7dc-bf63150165a9
Consumed: 543ba253-eeeb-4387-b7b0-90b991f5a812
```

Programa com a variável "ncons":

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
+ ls /tmp/test
+ /home/schaiana/Downloads/SOP/multi_prod_cons
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: 5c391630-4531-49ab-91c3-3aa24df6ab87
Consumed: 1460f0bb-1070-415b-b36c-06cf61f54dbd
Consumed: 7155dbcc-6122-46d1-bb4e-233a121f93e2
Consumed: ec8dead5-e273-4a44-b9e4-876a25cda007
Consumed: ff37213b-a6fe-44c3-88ae-eac5d6401550
Consumed: 189b3bc4-4fb2-4105-b72f-25732d8dd7ef
Consumed: 924f0a77-c0d5-4ce4-a675-ab45b8452c80
Consumed: ea3b2f3b-c7a0-49b9-b39b-a638c5d0e41e
Consumed: 508bea48-9476-4595-a0ef-6a13f559f60c
Consumed: 78ed8cf2-0c21-45d6-8727-9ab3df7e6ad8
Total produced: 10
Total consumed: 10
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Etapa 2:

Programa funcionando com 5_1_1:

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
+ ls /tmp/test
+ /home/schaiana/Downloads/SOP/multi_prod_cons
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: f750b2e4-1793-4da2-9ce0-ac8785cb700a
Consumed: 4acbac42-addb-4395-a73c-efdb651a7a84
Consumed: e0dc0b25-cfe4-4fe6-a174-0a6f7cc21f62
Consumed: dc1c144e-1a26-4fd3-a56a-eb1098449113
Consumed: d887aa1d-4286-49ce-b6b9-3a60c693fa4f
Consumed: 84b76e39-2364-4b8c-98b3-0835a480798a
Consumed: 9b0befef-b919-4548-9eb7-c28d75895c08
Consumed: c40438bc-2ddb-40e7-9743-4dc2f8c36f88
Consumed: 713883fd-d035-486e-9aaa-fdda667bbf89
Consumed: 614406dd-4a23-48ea-83d5-0505c20b019a
Total produced: 10
Total consumed: 10
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Programa funcionando com 10_1_1:

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
+ ls /tmp/test
+ /home/schaiana/Downloads/SOP/multi_prod_cons
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: d4fd3325-1e57-455d-a237-867964ea1c38
Consumed: e0338b0c-1730-4101-a447-bc54404c2782
Consumed: 1b0196b3-f860-4199-b08e-bfaabaa56e2a
Consumed: e7c00e5c-9221-4bc7-8e57-3ee74e15487e
Consumed: 97d6b5c4-c6d6-44a5-abdf-ddb95cb8b4e4
Consumed: 70fa741f-28ee-4322-8211-bf78028a41ae
Consumed: e32c122b-fed6-4b7d-aeb3-030e95dc021c
Consumed: 0daf93c2-5be0-49d0-80d2-4104446e8baf
Consumed: e0a8621d-1fd3-459b-8a73-4bd5b02f5306
Consumed: f7db2273-7e1d-464c-8fe6-0e0e5dc274a0
Total produced: 10
Total consumed: 10
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Programa funcionando com 15_1_1:

```
schaiana@Schaiana-K46CB:~/Downloads/SOP$ ./script.sh
+ ls /tmp/test
+ /home/schaiana/Downloads/SOP/multi_prod_cons
Massive Producer x Consumer Problem
Producer was born!
Consumer was born!
Consumed: 6dfb32c4-d7e6-4652-a16c-35c846cee614
Consumed: 06872509-1198-4654-bcfa-b7ce4efa4d63
Consumed: 77031d83-13c6-4ed5-81b5-4bdd6bf1184b
Consumed: e9586995-3003-4c59-b8f3-1d3a0be8b57a
Consumed: 085411c4-e172-4832-ada8-823863920aa3
Consumed: cc1232bf-b1c2-44da-b1d7-20e43d45a6f5
Consumed: e5ae087b-3c19-458b-9c15-a2e06ec4f5f5
Consumed: 3d62ad22-a18b-4ea5-b791-799d9f57c684
Consumed: 7ebf8ef8-cf8b-4ebf-bc4e-079625d8e986
Consumed: 436e00a3-9093-4596-9522-871b6594679d
Total produced: 10
Total consumed: 10
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Etapa 3:

Programa funcionando com 15_5_1:

```
Consumed: 824bac73-3553-4541-bed4-568e92c3ecde
Consumed: de1d1aae-d07e-4c00-a698-d976426802ba
Consumed: 6ee80bb5-dcc6-43e8-b8a3-a850a46f96b9
Consumed: 1df66593-a7df-48d6-b4c5-ca077e3788ab
Consumed: 3f3a307e-c32b-4a5e-8019-9aa73e535f8e
Consumed: 6c0c6bbe-a291-4341-b412-7690ec1a77d5
Consumed: 0640cdfa-4ebd-4299-afb3-8745d7f5e130
Consumed: 2aeb22ad-6cf1-43ff-81d4-30756e8e494e
Consumed: 2e495002-f6f1-4338-9870-f42d5fadd8c1
Consumed: 019e0ff9-1919-4a70-b68b-9b5ed45a9bc0
Consumed: 2427632f-00ff-456e-aa03-8c0f52ca9685
Consumed: ca319f36-f48b-4b73-8bdd-02bf44fcfa4a
Consumed: 5aec3fe0-6093-470e-ae2e-fe5b9bfd5d26
Consumed: e1875119-745d-43b7-b609-5f81c173a2b3
Consumed: cd91a3af-dd03-48ca-ace6-0962a134a6cf
Consumed: ff755dc3-7e5c-4664-9d04-3fa4cad86fe1
Consumed: 141aa60d-c9d1-48cd-b93c-f61202ed8d4a
Consumed: 8a1484ea-54f8-4191-954f-3f0e9e944a21
Consumed: 076b852b-431d-4e2c-aa1f-70ecfb2e894d
Consumed: 4e88203b-2f86-4c56-a3b1-478c4bc8c815
Consumed: 440b0417-97fd-44e9-84b1-5e09c918b98a
Consumed: 90595547-4d8e-427e-9ba3-86babb2f677f
Consumed: 5db5cf7d-0451-4a66-bd9d-d54dccfb4a3f
Consumed: 4cf9042d-6177-4ffd-acec-57deb6698e7b
Consumed: 2ae4a0be-5093-4440-bb99-84ee453447de
Consumed: a06b1e9e-5f99-4c72-a84a-825b952da53c
Consumed: a89712d4-3676-42bc-84f2-f5401535acc0
Consumed: a3ec4882-3721-484a-bd56-6139aae72887
Consumed: 01499f8d-277a-4998-a961-6e8e30fb3054
Consumed: 8747b401-c699-4626-9637-e1d8b976c265
Consumed: 82928521-4d12-4cbb-8994-793417a9e384
Consumed: d476c683-34f8-4389-b9db-f1de75041b12
Consumed: fb64a797-4490-4a93-a88d-30e0a509ed36
Total produced: 50
Total consumed: 50
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Programa funcionando com 15_35_1:

```
Consumed: b10199ee-778e-469c-83c5-fee02d28563b
Consumed: dd13bc8e-5f7e-4e62-a3a1-a9eedb4dc772
Consumed: a05c3913-96b9-47a5-970a-468dbe632217
Consumed: 55e86983-4684-4597-ab2c-b3d50fe7937b
Consumed: c4090a0a-5a96-4925-b6a0-2f81eaff95f5
Consumed: 9fb418dd-d3e5-403a-97ed-66e3628d306b
Consumed: 00d824ed-7456-47b8-a6be-623e29d7fdd7
Consumed: 6c8f6e4f-2711-4c40-adab-cd5c2f039bf9
Consumed: 43c2f421-74be-4246-bb41-bb662182a163
Consumed: bee4affd-aa48-4810-a217-46b4a498e8b8
Consumed: 30afa7d7-861b-47ed-b71e-03a552bbae18
Consumed: b95e5f0d-fe86-423a-944b-5c4f158e2c63
Consumed: 701fd83f-ac41-44ba-83f4-c5471a16b7fa
Consumed: ca9f0930-9402-4362-a1dc-c5c7779ae910
Consumed: 8b469330-726d-4672-9f10-68781b795f3e
Consumed: 6f96f1a5-779e-47c0-a4a6-37831ae0eed5
Consumed: 96e0fe19-ff39-4464-999f-086e3be42b39
Consumed: 72030226-818c-4a23-bf60-6d6273e5500d
Consumed: b180f04e-7893-42db-a40d-4ee35d2963b1
Consumed: 25e2cc2c-8c61-48c5-a6e1-55cdbef4deff
Consumed: 04191b7f-f58a-429e-b9aa-77904bf76213
Consumed: 47171800-2411-452a-b3cd-0f4c17a5f9ba
Consumed: b4e293fa-d1f4-40c5-ac82-7b27df2053ee
Consumed: e0b452fe-7d5f-4746-86de-f215d4943050
Consumed: 5766fff6-a583-45e6-a752-6dc60e32b4a9
Consumed: 259c052c-c638-4df8-91f1-84291ef13be2
Consumed: 96072f6f-556c-430c-af2b-81148fdd7d3d
Consumed: 369f3bbc-504a-4c58-912a-5786b3dded15
Consumed: e08e8255-6e69-4430-88df-f54a095866ac
Consumed: a30d65a0-823d-42a8-a39e-4871e4437450
Consumed: 16e056d3-1e3d-4127-a5f6-52611cb5565d
Consumed: e8e9a9ef-dc59-400f-812c-2565923131e8
Consumed: 1b938ea1-2e0d-4b01-b3ad-f8443c15d7bb
Total produced: 350
Total consumed: 350
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Programa funcionando com 15_100_1:

```
Consumed: 9b0c09ad-5fdc-4ed0-823d-b20c36d18781
Consumed: b8d20cab-4c7f-4f5e-8b70-82d6611f8004
Consumed: 61a6b75c-ab53-4df7-b9ac-342313edcc1f
Consumed: b9aa0ffb-95c9-41e6-bca1-cabdc7ca7505
Consumed: 1f0773e4-5cae-4ace-8819-0787a380a188
Consumed: 9ef8c1b8-c28c-45e6-9b8f-9ad7ed64275e
Consumed: 8c8cda03-3890-472f-b36d-106438cca989
Consumed: 3b34b8fb-dc2e-4b69-9181-4c05a8d9e196
Consumed: 4ee1e752-9c08-4bd6-a64b-e69751b71c78
Consumed: 437eaac4-b452-4d0b-b13e-7b9231ad7d95
Consumed: d18b7383-1d37-4691-87c8-c79b830aaef5
Consumed: 5fc3120c-28c1-4f62-86c1-72f16f00b189
Consumed: fd76398b-ae58-4f94-956d-8c6951d5ea48
Consumed: ff1b2cb5-a8c7-482a-b146-503b216bfd9a
Consumed: f23dfbed-94a9-4b69-a097-4cc0ac88609d
Consumed: 42e41879-3a77-4742-b326-5cd28d3daebf
Consumed: 05ba9acd-f335-432f-af4b-7caf42ba1809
Consumed: f5c93b67-c866-4bbe-8e5f-44339755b5d0
Consumed: c73881b3-2a80-45ef-8772-8245b51ab117
Consumed: 5f50e03a-aa3f-4d5a-ad15-bf4a4bf02f8b
Consumed: 97124928-3451-45e5-8ba4-a50f638fe365
Consumed: 2c7ad151-bbf0-49c2-a559-ca6fe42a4902
Consumed: abefa581-92a7-4051-923f-c5df5387d566
Consumed: d70e1e7c-2ee9-488d-bee9-09dfc15f5df0
Consumed: e176e8b5-85d8-4850-b85c-11d2a2791f38
Consumed: 72d5bc35-92d4-4a85-b78d-514a14e414b4
Consumed: 9bde6f32-3710-4255-ab3f-00e2188f7b66
Consumed: e8f0787e-5ff1-40f6-8cb6-c31db38c8b1d
Consumed: 8f2a6760-5dd8-4969-ad1e-15ba9156ac03
Consumed: 9239ba82-1f42-471a-b615-53fd15fd7ee4
Consumed: f9b29372-b280-4861-ac8e-279cdf073b24
Consumed: 0f72b633-1b3a-4c7d-82cc-c26e4c4ddf64
Consumed: ffd1d4b5-3321-4d25-a39a-287b0001e2de
Total produced: 1000
Total consumed: 1000
+ cd /home/schaiana/Downloads/SOP
+ ls /tmp/test
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Etapa 4:

Programa funcionando com 25_10_1:

```
Consumed: 7ec5e602-36b1-4408-ac41-276f9e95a086
Consumed: f255fb91-0eb1-43ae-8a83-bc46d385d87c
Consumed: fbc61dac-9d7c-4454-8861-2a32c08a9222
Consumed: 108b8565-4e49-49cf-9a0f-4f050c7b18a5
Consumed: 3ca26eb5-58bf-4f5f-8e9c-ec8f42a4d7eb
Consumed: f08d44bd-dde6-4ea4-a0a9-41c345580043
Consumed: dda03011-c7ad-42cb-9eee-d04a3b0eb77f
Consumed: ced18950-3748-4206-9dbf-a370feaf098c
Consumed: f2810da7-0575-4712-8a2f-1891d9139fbf
Consumed: fc1d8c03-ae0b-4ccf-88c7-d6c6e3300832
Consumed: 4aa5f91d-61d1-44d6-99fb-e4875bc4fd99
Consumed: 4070678c-3063-46bc-8df7-2beaff377a8b
Consumed: ef712f0e-ab56-4271-b9d7-52c5a62d4e9e
Consumed: dad73472-b6bf-44b8-bd25-05c765fe6591
Consumed: b209650a-51ed-495f-9ef1-2072e98302ec
Consumed: dd2580ce-1fb5-4efb-b8e6-96c392f8a6e6
Consumed: f68cc6b9-a665-4846-ad00-2bc04ae7b58b
Consumed: a664c4ec-c313-4ccf-a597-a2335914565c
Consumed: 533549c3-0f8d-45de-aeee-04c70415d379
Consumed: 8a937a7e-deec-48f5-b6e5-4320e32901fe
Consumed: 9b5b93b4-63df-4996-8113-dc7d8e4c14a3
Total produced: 100
Total consumed: 100
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Programa funcionando com 25_100_1:

```
Consumed: 9df88e86-70ca-43ca-ace5-c9c3e6e0644a
Consumed: c005b6c1-fed7-431f-b30f-8ad26e7e5e6e
Consumed: 310b659e-2960-4795-9540-1a829fb2db12
Consumed: 6f546a83-40d9-407c-bdda-857fcddbe976
Consumed: 3da117fd-e502-4da6-98ae-bf56118dc5eb
Consumed: 521d3bb1-59a7-439b-8f9c-0054a5837dd1
Consumed: 8e3fd1a0-24af-431c-a286-8e674b6996b4
Consumed: 135dd30e-356f-47e0-832d-b173e6ecf3e2
Consumed: 9696dcf7-5282-4995-8dc3-f96000d108d2
Consumed: 93a3b823-3b23-4af7-b223-09f4332476b4
Consumed: 94fec8f2-9b6d-4933-a77f-13e8aa6dd38e
Consumed: 67dbceb1-4228-4446-bb1d-a216ce236f3f
Consumed: 69122856-cfa7-4880-a30f-5b69cd23f469
Consumed: 4547093f-30ab-4f4b-a8dc-83574e298462
Consumed: 5a76cd76-5faf-4b1d-83f3-b3a99718b317
Consumed: bf629caf-8a88-4045-a1ea-fcb3d2e71444
Consumed: 675290de-98c0-479e-996f-dc08324244f2
Consumed: d57ce16b-c3ad-4c8f-8652-6ebb76748050
Consumed: 08fdad42-3b5e-4848-9656-706935bd44f8
Consumed: cf642a47-ca8c-409a-baa7-6a607678bab2
Consumed: f0200d6b-eab0-4524-ad08-58520b1a8d8f
Total produced: 100
Total consumed: 100
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Programa funcionando com 25_200_1:

```
Consumed: 1f7e28f5-cb1f-430e-ad52-1ca5bae0f308
Consumed: fecd7cec-fe8b-4d57-9e01-89d827d46a76
Consumed: 5ac90096-7cd1-4937-ab43-e8c518719b37
Consumed: 6ec41522-cfe0-4cc7-91b6-d98e58526b2c
Consumed: 7392eebe-6ad1-4f6f-bafb-0ad1b1873d79
Consumed: 3e6eda37-f9f5-4249-adc3-08697a2a67e8
Consumed: 1097a9c2-9788-4168-81f3-a4116aead494
Consumed: db31565d-1fb2-49aa-a13a-e29b42e0c5c3
Consumed: 0bac97fb-0ae6-4eaf-b1fd-0db3c10da5fd
Consumed: 191d47ce-4747-416f-9c63-5656ef326cd0
Consumed: b52414d4-cf52-432f-a362-ad0c0c12e19d
Consumed: fb43e0d6-6d8d-45bc-bf83-f43ade4400d4
Consumed: 3911ea7e-c52c-4707-acc2-81d91a0fe829
Consumed: 90cc9668-2c9f-4179-b58c-e229cf426d4b
Consumed: 1167b101-db4b-4927-bc7b-978be599200b
Consumed: 1d796b96-514e-4280-8d58-3e12284f306c
Consumed: 255cb92c-223c-416a-b28c-ae5a21fd42ce
Consumed: 741846f1-737b-4d64-aa22-0bece4b9acf0
Consumed: 1284142f-136a-41a6-9125-b44a47bd6c3f
Consumed: 38bf973f-2000-4925-a8c2-b2caa3874161
Consumed: 8344a2b6-2615-4b1f-b15d-7b279e267826
Total produced: 100
Total consumed: 100
schaiana@Schaiana-K46CB:~/Downloads/SOP$
```

Referências:

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